

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent of:

MUSOLL et al.

Patent No.: 7,065,096 B2

Issued: June 20, 2006

**For: Method For Allocating Memory  
Space For Limited Packet Head  
And/Or Tail Growth**

Confirmation No.: 8076

Art Unit: 2662

Examiner: Melvin C. Marcelo

Atty. Docket: 1778.3220000 (0178.00US)

**Reconsideration of Request for Certificate of Correction  
Under 37 C.F.R. § 1.322**

*Attn: Certificate of Correction Branch*

Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Sir:

It is hereby requested that a Certificate of Correction under 37 C.F.R. § 1.322(a) be issued for the above-captioned United States Patent or in the alternative that the Director consider issuing a Corrected Patent in lieu of a Certificate of Correction Under 37 C.F.R. § 1.322(b). This request is due to errors which appear in the printed patent. Applicants respectfully submit the U.S. Patent and Trademark Office made these errors.

Specifically, Applicants respectfully submit the printed patent contains the following errors on its front page:

(1) INID code (63) incorrectly recites:

Continuation-in-part of application No. 09/737,735, filed on Dec. 14, 2000, which is a continuation-in-part of application No. 09/602,279, filed on June. 23, 2000.

and (2) INID code (60) incorrectly recites:

Provisional application No. 60/181,364, filed on Feb 8, 2000.

### ***Summary***

Applicants filed U.S. Patent Application No. 09/933,934 on August 20, 2001, (the "'934 Application") which issued as the U.S. Patent No. 7,065,096 on June 20, 2006 (the "'096 Patent"). At the time of filing, Applicants supplied the correct related application data. Indeed, the file wrapper of the '934 application plainly demonstrates that throughout the prosecution of the '934 application, the correct related application data was maintained. Yet, for reasons unclear to Applicants, and through no act or fault on their part, the '096 patent issued with incorrect data for INIDs (63) and (60) on its front page. Because these errors arose without action, request by, or fault on the part of the Applicants, Applicants respectfully submit they are the fault of the U.S. Patent and Trademark Office. Consequently, Applicants respectfully request a Certificate of Correction or, if the Director deems it appropriate, a newly issued patent to correct these errors.

### ***Factual Background***

Applicants filed U.S. Patent Application No. 09/933,934 on August 20, 2001. At the time of filing the application, Applicants recited the related application data in the specification as:

The present invention is a continuation in part (CIP) to a U.S. patent application S/N 09/737,375 entitled ***"Queuing System for Processors in Packet Routing Operations"*** and filed on 12/14/00, which is incorporated herein in its entirety by reference. In addition, S/N 09/737,375 claims priority benefit under 35 U.S.C. 119(e) of Provisional Patent Application serial number 60/181,364 filed on 2/8/2000, which is also incorporated in its entirety by reference. The present application is also a CIP of patent application serial number 09/602,279 filed on 06/23/2000 and is incorporated herein in its entirety by reference.

(See Exhibit A).

Thereafter, numerous documents issued by the USPTO, contained the correct application data. For example, three documents entitled Bibliographic Data Sheet (a.k.a. bib-data sheet), which appear in the Patent Application Information Retrieval ("PAIR") system with document dates of August 20, 2001, March 28, 2005, and November 3, 2005, contained the correct related application data as follows:

THIS APPLICATION IS A CIP OF 09/737,375 12/14/2000  
WHICH CLAIMS BENEFIT OF 60/181,364 02/08/2000  
AND A CIP OF 09/602,279 06/23/2000

(See Exhibit B).

This application is a CIP of 09/737,375 12/14/2000  
which claims benefit of 60/181,364 02/08/2000  
and is a CIP of 09/602,279 06/23/2000

(See Exhibits C and D).

According to the MPEP §202.02, a Bibliographic Data Sheet contains the prior application data, and is used by the Examiner to check for accuracy. As explained in §202.02:

Where the data is correct, the examiner should initial \*\* the PALM bib-data sheet \*\* in the provided space. Should there be error in the preprinted \*>prior< application data, the \*\* correction or entry of the data in the PALM data base can be made by technical support staff of the Technology Center. Upon entry of the data, a new PALM bib-data sheet should be printed and \*\*>scanned into< the file.

In accordance with this procedure, the Examiner initialed the March 28, 2005 and November 3, 2005 Bibliographic Data Sheets indicating the data thereon is correct.

The Patent and Trademark Office mailed a filing receipt containing the correct related application data on September 6, 2001. The filing receipt priority data correctly read:

THIS APPLICATION IS A CIP OF 09/737,375 12/14/2000  
WHICH CLAIMS BENEFIT OF 60/181,364 02/08/2000  
AND A CIP OF 09/602,279 06/23/2000

(See Exhibit E)

The Patent and Trademark Office mailed a updated filing receipt on October 29, 2001. The updated filing receipt also contained the correct related application data as:

THIS APPLICATION IS A CIP OF 09/737,375 12/14/2000  
WHICH CLAIMS BENEFIT OF 60/181,364 02/08/2000  
AND A CIP OF 09/602,279 06/23/2000

(See Exhibit F)

All of the data is included in INID (63).

On June 20, 2006, the '934 Patent Application issued as the '096 Patent. As issued, the '096 patent contains a recitation (col. 1, lines 7-17) of the correct related application data as follows:

The present invention is a continuation in part (CIP) to a U.S. patent application Ser. No. 09/737,375 entitled "Queuing System for Processors in Packet Routing Operations" and filed on Dec. 14, 2000, which is incorporated herein in its entirety by reference. In addition, Ser. No. 09/737,375 claims priority benefit under 35 U.S.C. 119(e) of Provisional Patent Application Ser. No. 60/181,364 filed on Feb. 8, 2000, which is also incorporated in its entirety by reference. The present application is also a CIP of patent application Ser. No. 09/602,279 filed on Jun. 23, 2000 and is incorporated herein in its entirety by reference.

(See Exhibit G).

Applicants attempted to correct this PTO error through two prior Requests for Certificate of Correction. On both occasions, the PTO denied their requests.

### *Argument*

Upon careful review of the PTO's decisions and the file wrapper history, Applicants respectfully submit the PTO listed related priority data on the front page of U.S. Patent No. 7,065,096 erroneously. In view of the clear record on this issue, the data listed in INID (63) is wrong and item (60) should not be present. 37 C.F.R. § 1.322(a)(1) provides, "[t]he Director may issue a certificate of correction pursuant to 35 U.S.C. § 254 to correct a mistake in a patent, incurred through the fault of the Office, which mistake is clearly disclosed in the records of the Office[.]" That is clearly the case here.

The PTO errantly listed priority data on the front of the '096 patent. That mistake is clearly reflected in the numerous correct recitations of the priority data provided in the record. It is incorrect to state that INID (63) is printed in accordance with the record, as the denial of Applicants' Request for Certificate of Correction under §1.322 of February 9, 2008 states. It is clear from the factual background presented that the related priority data was correct throughout the prosecution of the '934 application. Only at some time prior to printing, and without the knowledge or approval of the Applicants, was the related priority data changed to its current format. This is not an "editing/style" error as characterized in the September 1, 2006 denial of Applicants' Request for Certificate of Correction under §1.322. Rather this is a substantive misprinting of priority data that was consistently correct throughout the prosecution of the '934 application.

As demonstrated by the file history, there is no dispute the data contained on the front page of the '096 patent, INIDs (60) and (63) are wrong. A correction should be made so that INID (63) reads as:

Continuation-in-part of application No. 09/737,375, filed on Dec. 14, 2000, which claims benefit of 60/181,364, filed on Feb. 8, 2000, and a continuation-in-part of application No. 09/602,279, filed on Jun. 23, 2000.

and, INID (60) and its contents are deleted.

A Form PTO/SB/44 accompanies this request, with the above-noted corrections printed thereon.

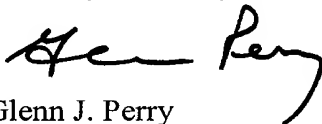
### *Conclusion*

In view of the foregoing, Applicants submit their request for Certificate of Correction or a newly issued patent should be granted.

The Commissioner is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.



Glenn J. Perry  
Attorney for Applicants  
Registration No. 28,458

Date: 22 Dec. 2009

1100 New York Avenue, N.W.  
Washington, D.C. 20005-3934  
(202) 371-2600  
818140\_7.DOC

**UNITED STATES PATENT AND TRADEMARK OFFICE  
SUPPLEMENTAL CERTIFICATE OF CORRECTION**Page 1 of 1PATENT NO: **7,065,096 B2**DATED: **June 20, 2006**INVENTORS: **Musoll *et al.***

It is certified that error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below.

Front page, continuity data (63) is incorrect. It should be replaced with the following which conforms to the application as originally submitted:

--Continuation-in-part of application No. 09/737,375, filed on Dec. 14, 2000, which claims benefit of 60/181,364, filed on Feb. 8, 2000, and a continuation-in-part of application No. 09/602,279, filed on Jun. 23, 2000.--

Front page, item (60) is incorrect, and should be deleted in its entirety.

**MAILING ADDRESS OF SENDER (Please do not use customer number below):**

1100 New York Avenue, NW

Washington DC 20005-3934

Atty. Dkt. No. 1778.3220000

This collection of information is required by 37 CFR 1.322, 1.323 and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you are required to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

818305\_1.DOC

**Method for Allocating Memory Space for Limited  
Packet Head and/or Tail Growth**

*Inventor(s)*

*Enric Musoll Stephen Melvin Mario Nemirovsky*

**Field of the Invention**

The present invention is in the field of digital processing and pertains to apparatus and methods for processing packets in routers for packet networks, and more particularly to apparatus and methods for allocating enough memory to packet storage for enabling packet growth during processing in dynamic multistreaming processors.

**Cross-Reference to Related Documents**

The present invention is a continuation in part (CIP) to a U.S. patent application S/N 09/737,375 entitled "*Queuing System for Processors in Packet Routing Operations*" and filed on 12/14/00, which is incorporated herein in its entirety by reference. In addition, S/N 09/737,375 claims priority benefit under 35 U.S.C. 119 (e) of Provisional Patent Application serial number 60/181,364 filed on 2/8/2000, which is also incorporated in its entirety by reference. The present application is also a CIP of patent application serial number 09/602,279 filed on 06/23/2000 and is incorporated herein in its entirety by reference. The inventors have also participated in the document disclosure program and claim priority to document disclosure number 492429.





## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov



Bib Data Sheet

CONFIRMATION NO. 8076

<b>SERIAL NUMBER</b> 09/933,934	<b>FILING DATE</b> 08/20/2001 <b>RULE</b>	<b>CLASS</b> 370	<b>GROUP ART UNIT</b> 2662	<b>ATTORNEY DOCKET NO.</b> P3829	
<b>APPLICANTS</b> Enrique Musoll, San Jose, CA; Mario Nemirovsky, Saratoga, CA; Stephen Melvin, San Francisco, CA;					
<b>** CONTINUING DATA *****</b> THIS APPLICATION IS A CIP OF 09/737,375 12/14/2000 WHICH CLAIMS BENEFIT OF 60/181,364 02/08/2000 AND A CIP OF 09/602,279 06/23/2000					
<b>** FOREIGN APPLICATIONS *****</b>					
<b>IF REQUIRED, FOREIGN FILING LICENSE GRANTED** SMALL ENTITY **</b> <b>** 09/06/2001</b>					
Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no 35 USC 119 (a-d) conditions <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after met Allowance Verified and Acknowledged	Examiner's Signature _____ Initials _____	<b>STATE OR COUNTRY</b> CA	<b>SHEETS DRAWING</b> 55	<b>TOTAL CLAIMS</b> 26	<b>INDEPENDENT CLAIMS</b> 2
<b>ADDRESS</b> 24739					
<b>TITLE</b> Method for allocating memory space for limited packet head and/or tail growth					
<b>FILING FEE RECEIVED</b> 474	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

## \*BIBDATASHEET\*

Bib Data Sheet

CONFIRMATION NO. 8076

SERIAL NUMBER 09/933,934	FILING DATE 08/20/2001  RULE	CLASS 370	GROUP ART UNIT 2662	ATTORNEY DOCKET NO. P3829
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## APPLICANTS

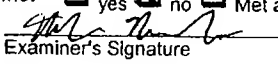
Enrique Musoll, San Jose, CA;

Mario Nemirovsky, Saratoga, CA;  
Stephen Melvin, San Francisco, CA;\*\* CONTINUING DATA <sup>3-mm</sup>\*\*\*\*\*

This application is a CIP of 09/737,375 12/14/2000  
which claims benefit of 60/181,364 02/08/2000  
and is a CIP of 09/602,279 06/23/2000

\*\* FOREIGN APPLICATIONS <sup>Nm mn</sup>\*\*\*\*\*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED  
\*\* 09/06/2001

Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	STATE OR	SHEETS	TOTAL	INDEPENDENT
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance	COUNTRY	DRAWING	CLAIMS	CLAIMS
Verified and Acknowledged  Examiner's Signature	CA	55	26	2
	Initials			

ADDRESS  
JAMES W. HUFFMAN  
HUFFMAN LWA GROUP, P.C.  
1832 N. CASCADE AVE.  
COLORADO SPRINGS, CO  
80907

## TITLE

Method for allocating memory space for limited packet head and/or tail growth

FILING FEE  RECEIVED 474	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit
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Exhibit C



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov



Bib Data Sheet

CONFIRMATION NO. 8076

SERIAL NUMBER 09/933,934	FILING DATE 08/20/2001  RULE	CLASS 370	GROUP ART UNIT 2662	ATTORNEY DOCKET NO. P3829
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APPLICANTS

Enrique Musoll, San Jose, CA;

Mario Nemirovsky, Saratoga, CA;  
Stephen Melvin, San Francisco, CA;

\*\* CONTINUING DATA \*\*\*\*\*

*3 - mm*  
This application is a CIP of 09/737,375 12/14/2000  
which claims benefit of 60/181,364 02/08/2000  
and is a CIP of 09/602,279 06/23/2000

\*\* FOREIGN APPLICATIONS \*\*\*\*\*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED

\*\* 09/06/2001

Foreign Priority claimed 35 USC 119 (a-d) conditions met Verified and Acknowledged	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance <i>[Signature]</i> Examiner's Signature	STATE OR COUNTRY CA	SHEETS DRAWING 55	TOTAL CLAIMS 26	INDEPENDENT CLAIMS 2
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ADDRESS

JAMES W. HUFFMAN  
HUFFMAN LWA GROUP, P.C.  
1832 N. CASCADE AVE.  
COLORADO SPRINGS, CO  
80907

TITLE  
METHOD FOR ALLOCATING MEMORY SPACE FOR LIMITED PACKET HEAD AND/OR TAIL GROWTH

FILING FEE RECEIVED 474	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit
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Exhibit D

3829



## UNITED STATES PATENT AND TRADEMARK OFFICE

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UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/933,934	08/20/2001	2662	409	P3829	55	26	2

CONFIRMATION NO. 8076

24739  
CENTRAL COAST PATENT AGENCY  
PO BOX 187  
AROMAS, CA 95004

## FILING RECEIPT



\*OC000000006521959\*

Date Mailed: 09/06/2001

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

## Applicant(s)

Enrique Musoll, San Jose, CA;  
Mario Nemirovsky, Saratoga, CA;  
Stephen Melvin, San Francisco, CA;

## Domestic Priority data as claimed by applicant

THIS APPLICATION IS A CIP OF 09/737,375 12/14/2000  
WHICH CLAIMS BENEFIT OF 60/181,364 02/08/2000  
AND A CIP OF 09/602,279 06/23/2000

## Foreign Applications

If Required, Foreign Filing License Granted 09/06/2001

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

\*\* SMALL ENTITY \*\*

## Title

Method for allocating memory space for limited packet head and/or tail growth

Preliminary Class

Exhibit E

3829



## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/933,934	08/20/2001	2662	474	P3829	55	26	2

24739

CENTRAL COAST PATENT AGENCY  
PO BOX 187  
AROMAS, CA 95004

CONFIRMATION NO. 8076

## UPDATED FILING RECEIPT



\*OC000000006989754\*

Date Mailed: 10/29/2001

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

## Applicant(s)

Enrique Musoll, San Jose, CA;  
Mario Nemirovsky, Saratoga, CA;  
Stephen Melvin, San Francisco, CA;

## Domestic Priority data as claimed by applicant

THIS APPLICATION IS A CIP OF 09/737,375 12/14/2000  
WHICH CLAIMS BENEFIT OF 60/181,364 02/08/2000  
AND A CIP OF 09/602,279 06/23/2000

## Foreign Applications

If Required, Foreign Filing License Granted 09/06/2001

Projected Publication Date: 02/07/2002

Non-Publication Request: No

Early Publication Request: No

\*\* SMALL ENTITY \*\*

## Title

Method for allocating memory space for limited packet head and/or tail growth

## Preliminary Class

Exhibit F

1

# METHOD FOR ALLOCATING MEMORY SPACE FOR LIMITED PACKET HEAD AND/OR TAIL GROWTH

## CROSS-REFERENCE TO RELATED DOCUMENTS

The present invention is a continuation in part (CIP) to a U.S. patent application Ser. No. 09/737,375 entitled "Queuing System for Processors in Packet Routing Operations" and filed on Dec. 14, 2000, which is incorporated herein in its entirety by reference. In addition, Ser. No. 09/737,375 claims priority benefit under 35 U.S.C. 119 (e) of Provisional Patent Application Ser. No. 60/181,364 filed on Feb. 8, 2000, which is also incorporated in its entirety by reference. The present application is also a CIP of patent application Ser. No. 09/602,279 filed on Jun. 23, 2000 and is incorporated herein in its entirety by reference. The inventors have also participated in the document disclosure program and claim priority to document disclosure number 492429.

## FIELD OF THE INVENTION

The present invention is in the field of digital processing and pertains to apparatus and methods for processing packets in routers for packet networks, and more particularly to apparatus and methods for allocating enough memory to packet storage for enabling packet growth during processing in dynamic multistreaming processors.

## BACKGROUND OF THE INVENTION

The well-known Internet network is a notoriously well-known publicly-accessible communication network at the time of filing the present patent application, and arguably the most robust information and communication source ever made available. The Internet is used as a prime example in the present application of a data-packet-network which will benefit from the apparatus and methods taught in the present patent application, but is just one such network, following a particular standardized protocol. As is also very well known, the Internet (and related networks) are always a work in progress. That is, many researchers and developers are competing at all times to provide new and better apparatus and methods, including software, for enhancing the operation of such networks.

In general the most sought-after improvements in data packet networks are those that provide higher speed in routing (more packets per unit time) and better reliability and fidelity in messaging. What is generally needed are router apparatus and methods increasing the rates at which packets may be processed in a router.

As is well-known in the art, packet routers are computerized machines wherein data packets are received at any one or more of typically multiple ports, processed in some fashion, and sent out at the same or other ports of the router to continue on to downstream destinations. As an example of such computerized operations, keeping in mind that the Internet is a vast interconnected network of individual routers, individual routers have to keep track of which external routers to which they are connected by communication ports, and of which of alternate routes through the network are the best routes for incoming packets. Individual routers must also accomplish flow accounting, with a flow generally meaning a stream of packets with a common source and end destination. A general desire is that individual flows follow a common path. The skilled artisan will be aware of many such requirements for computerized processing.

2

Typically a router in the Internet network will have one or more Central Processing Units (CPUs) as dedicated micro-processors for accomplishing the many computing tasks required. In the current art at the time of the present application, these are single-streaming processors; that is, each processor is capable of processing a single stream of instructions. In some cases developers are applying multi-processor technology to such routing operations. The present inventors have been involved for some time in development of dynamic multistreaming (DMS) processors, which processors are capable of simultaneously processing multiple instruction streams. One preferred application for such processors is in the processing of packets in packet networks like the Internet.

In a data-packet processor, a configurable queuing system for packet accounting during processing is known to the inventor and disclosure for same is referenced herein as Ser. No. 09/737,375 in the Cross-Reference section of this specification. The queuing and accounting system has a plurality of queues arranged in one or more clusters, an identification mechanism for creating a packet identifier for arriving packets, insertion logic for inserting packet identifiers into queues and for determining into which queue to insert a packet identifier, and selection logic for selecting packet identifiers from queues to initiate processing of identified packets, downloading of completed packets, or for re-queuing of the selected packet identifiers.

A portion of the memory in the above-described system is called packet memory. The packet memory is the memory where data packets reside before they can be downloaded by a packet management unit (PMU) to an output network interface (ONI) during packet processing and routing. A portion of the packet memory described above is called the local packet memory (LPM), and it is directly managed by hardware in the PMU instead of by software.

Whenever a data packet has been processed and is ready to be downloaded from LPM, the processing core or streaming processor unit (SPU) sends a command PKTDONE to the PMU. This command contains, among other information, a packet identifier (typically a number) of the packet that is ready to be downloaded. The PMU will then proceed with the download of this packet if it resides in LPM. If not, software operating through a system interface unit (SIU) will download the packet upon request.

Data packet processing occurs using context registers. In a dynamic multistreaming processor running eight streams, there are at least eight context registers for processing data packets. The context registers are located physically within the streaming processor core having associated therewith functional units required for processing. In this example, each context can have a state of either PMU-owned or SPU-owned. When information is being preloaded into a context the context is PMU-owned. When a stream is running within a context, the context is SPU-owned.

During packet processing wherein the SPU is executing instructions to process a data packet, it is possible that the data packet in process will be caused to grow (become larger) in terms of header data and/or tail data. Packet growth during SPU processing may cause the process to overwrite consecutively stored data packets information in memory. The problem presented by this possible growth phenomena is that in order to avoid a possible overwrite and data corruption issue, a packet that has outgrown its memory space must be moved during processing to a new memory space that is large enough (larger than before) to hold it in its expanded form. Repeated instances of this requirement